AMENDMENTS TO THE CLAIMS

Please add the following new claims 61 and 62:

1. (Previously Presented) An apparatus for processing microelectronic workpieces, comprising:

a plurality of processing stations, an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations; and

a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations, the transfer device being positioned to release the microelectronic workpieces for processing at the processing stations, the transfer device including a first end effector and a second end effector, each being rotatable relative to the other about a common axis.

2. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

a first vessel configured to provide a processing fluid, the first vessel having a weir to define a level of the processing fluid;

a second vessel disposed around the first vessel to receive the processing fluid proceeding over the weir;

a workpiece support positioned to carry the microelectronic workpiece in contact with the processing fluid in the first vessel;

a first electrode support positioned in the first vessel and configured to carry a first electrode; and

a second electrode support carried by the workpiece support and positioned to carry a second electrode in contact with the microelectronic workpiece when the workpiece support carries the microelectronic workpiece.

3. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

at least one vessel configured to provide a processing fluid;

one or more electrode supports positioned in the vessel and configured individually or together to carry a plurality of first electrodes; and

a workpiece support positioned at least proximate to the at least one vessel to carry the microelectronic workpiece in contact with the processing fluid in the vessel, the workpiece support being configured to carry at least one second electrode in contact with the microelectronic workpiece when the workpiece support carries the microelectronic workpiece.

4. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

at least one vessel configured to carry a processing fluid;

one or more electrode supports positioned in the vessel and configured individually or together to carry a plurality of first electrodes, the first electrodes being spaced annularly apart from each other; and

a workpiece support positioned at least proximate to the at least one vessel to carry the microelectronic workpiece in contact with the processing fluid in the vessel, the workpiece support being configured to carry at least one second electrode in contact with the microelectronic workpiece when the workpiece support carries the microelectronic workpiece.

5. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

a reaction vessel comprising -

an outer container having an outer wall;

a first inlet configured to introduce a primary flow into the outer container;

at least one second inlet configured to introduce a secondary flow into the outer container separate from the primary flow;

a dielectric field shaping unit in the outer container coupled to the second inlet to receive the secondary flow, the field shaping unit being configured to contain the secondary flow separate from the primary flow through at least a portion of the outer container, and the field shaping unit having at least one electrode compartment through which the secondary flow can pass while the secondary flow is separate from the primary flow, the electrode compartment being configured to receive at least one electrode.

6. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

a first vessel configured to provide an electroless processing fluid, the first vessel having a weir positioned to define a level of the processing fluid;

a second vessel disposed around the first vessel to receive the electroless processing fluid proceeding over the weir;

a support positioned to carry the microelectronic workpiece in contact with the electroless processing fluid in the first vessel; and

a reservoir configured to carry the electroless processing fluid, the reservoir being in fluid communication with the first vessel.

7. (Original) The apparatus of claim 1 wherein at least one of the processing stations includes a metrology station having:

a support configured to releasably carry the microelectronic workpiece;

a measurement device positioned at least proximate to the support and configured to detect a characteristic of a conductive material of the microelectronic workpiece; and

an output device operatively coupled to the measurement device to transmit an output signal corresponding to the detected characteristic of the conductive material of the microelectronic workpiece.

8. (Original) The apparatus of claim 1 wherein at least one of the processing stations includes a spray station having:

a vessel configured to carry a fluid;

a support positioned proximate to the vessel, the support being configured to carry the microelectronic workpiece; and

a fluid manifold positioned within the vessel, the fluid manifold being coupleable to a source of fluid, the fluid manifold having a plurality of fluid jets directed toward the support to spray the microelectronic workpiece with the fluid.

9. (Original) The apparatus of claim 1 wherein at least one of the processing stations includes a material removal station, the material removal station including a rotor having a first portion and a second portion facing toward the first portion, the first and second portions defining a chamber volume configured to removably receive the microelectronic workpiece, wherein the first portion includes a first fluid passage having a first aperture directed into the chamber volume and facing the second portion, the first aperture being coupleable to a first fluid source, and wherein the second portion includes a second fluid passage having a second aperture directed into the chamber volume and facing the first portion, the second aperture being coupleable to a second fluid source.

10. (Original) The apparatus of claim 1 wherein at least one of the processing stations includes a thermal processing station having a heater configured to elevate a temperature of the microelectronic workpiece.

11. (Original) The apparatus of claim 1 wherein at least one of the processing stations includes a thermal processing station, the thermal processing station having:

a base;

a support carried by the base and configured to removably contact the microelectronic workpiece;

a lid proximate to the base, at least one of the base and the lid being movable relative to the other between a closed position and an open position, the lid and the base defining a thermal processing space when in the closed position;

a heater positioned between the base and the lid;

a first heat sink positioned proximate to the heater and movable relative to the heater between a first position with the first heat sink in thermal contact with the heater and a second position with the first heat sink spaced apart from the heater; and

a second heat sink positioned proximate to the first heat sink, the second heat sink being in thermal contact with the first heat sink when the first heat sink is in the second position.

12. (Original) The apparatus of claim 1, further comprising a shield positioned at least proximate to the transfer device to at least restrict access by the user to the transfer device.

13. (Previously Presented) The apparatus of claim 1 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second generally parallel line, and wherein the apparatus further comprises an enclosure disposed around at least one of the processing stations, the enclosure having a first access aperture through which the user can manually access all the processing stations, the enclosure having a second access aperture accessible to the robot and through which the robot can move microelectronic workpieces,

with the second line being positioned between the first line and the first and second access apertures.

14. (Original) The apparatus of claim 1 wherein all the processing stations of the apparatus are manually accessible from a single side of the apparatus.

15. (Previously Presented) The apparatus of claim 57 wherein the application station includes a vessel and a support movably positioned proximate to the vessel and configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and wherein the support is oriented to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

16. (Original) The apparatus of claim 1, further comprising an enclosure having a first surface with a first access aperture and a second surface facing opposite from the first surface and having a second access aperture, the first and second access apertures alone being sized and positioned to allow manual access to the transfer device and all the processing stations for loading the microelectronic workpieces and/or servicing an interior region of the enclosure.

17. (Original) The apparatus of claim 1, further comprising an enclosure disposed around at least one of the processing stations, the enclosure having a first surface facing a first direction and a second surface facing opposite the first surface, the first surface having at least one first access aperture, the second surface having at least one second access aperture, and wherein the enclosure has a third and a fourth surface extending between the first and second surfaces and facing in opposite directions from

each other, and wherein the third and fourth surfaces have no apertures sized to allow manual access to the transfer device or the processing stations.

18. (Previously Presented) The apparatus of claim 57 wherein the application station includes:

at least one vessel configured to carry a processing fluid;

one or more electrode supports positioned in the vessel and configured individually or together to carry a plurality of first electrodes, the first electrodes being spaced annularly apart from each other; and

a workpiece support positioned at least proximate to the at least one vessel to carry the microelectronic workpiece in contact with the processing fluid in the vessel, the workpiece support being configured to carry at least one second electrode in contact with the microelectronic workpiece when the workpiece support carries the microelectronic workpiece, and wherein the apparatus further comprises a spray station having:

a spray vessel configured to provide a spray fluid;

a spray support positioned proximate to the spray vessel and configured to carry the microelectronic workpiece; and

a spray fluid manifold positioned within the spray vessel, the spray fluid manifold being coupleable to a source of spray fluid, the spray fluid manifold having a plurality of fluid jets directed toward the support to spray the microelectronic workpiece with the spray fluid.

19. (Previously Presented) The apparatus of claim 57 wherein the application station is a first application station configured to enhance and/or repair a seed layer of the microelectronic workpiece, and wherein at least one of the processing stations includes a material removal station, further wherein at least another of the processing stations includes a second application station configured to apply a blanket layer of conductive material to the microelectronic workpiece, still further wherein at least another of the

processing stations includes a thermal processing station configured to anneal a conductive material of the microelectronic workpiece.

20. (Previously Presented) The apparatus of claim 57 wherein the application station is configured to electrophoretically deposit an electrophoretic resist material on the microelectronic workpiece, and wherein at least one of the processing stations includes a thermal processing station having a heater and being configured to receive the microelectronic workpiece with the electrophoretic resist material and elevate a temperature of the electrophoretic resist material, and wherein at least another of the processing stations includes a spray station having a spray vessel configured to carry a spray fluid, a spray support positioned proximate to the spray vessel and configured to carry the microelectronic workpiece, and a spray fluid manifold positioned within the spray vessel, the spray fluid manifold being coupleable to a source of spray fluid, the spray fluid manifold having a plurality of fluid jets directed toward the support to spray the microelectronic workpiece with the spray fluid.

21. (Previously Presented) An apparatus for processing microelectronic workpieces, comprising:

a plurality of processing stations, at least one of the processing stations including a material removal station configured to remove material from the microelectronic workpieces;

an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations; and

a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations, the transfer device including a first end effector and a second end effector, each being rotatable relative to the other about a common axis.

22. (Original) The apparatus of claim 21 wherein the material removal station includes a rotor having a first portion and a second portion facing toward the first portion, the first and second portions defining a chamber volume configured to removably receive the microelectronic workpiece, wherein the first portion includes a first fluid passage having a first aperture directed into the chamber volume and facing the second portion, the first aperture being coupleable to a first fluid source, and wherein the second portion includes a second fluid passage having a second aperture directed into the chamber volume and facing the first portion, the second aperture being coupleable to a second fluid source.

23. (Original) The apparatus of claim 21 wherein the material removal station includes:

a rotor having a first portion and a second portion facing toward the first portion, the first and second portions defining a chamber volume configured to removably receive the microelectronic workpiece, wherein the first portion includes a first fluid passage having a first aperture directed into the chamber volume and facing the second portion, and wherein the second portion includes a second fluid passage having a second aperture directed into the chamber volume and facing the first portion;

a first fluid source coupled to the first aperture to provide a first fluid to the first aperture; and

a second fluid source coupled to the second aperture to provide a second fluid to the second aperture, at least one of the first and second fluids being configured to remove material from the microelectronic workpiece.

24. (Original) The apparatus of claim 21 wherein the material removal station includes:

a spray vessel configured to provide a spray fluid;

a support positioned proximate to the spray vessel, the support being configured to carry the microelectronic workpiece;

a spray fluid manifold positioned within the spray vessel, the spray fluid manifold being coupleable to a source of spray fluid, the spray fluid manifold having a plurality of fluid jets directed toward the support to spray the microelectronic workpiece with the spray fluid.

25. (Original) The apparatus of claim 21 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line, and wherein the apparatus further comprises an enclosure disposed around at least one of the processing stations, the enclosure having a first access aperture through which the user can manually access all the process stations, the enclosure having a second access aperture accessible to the robot and through which the robot can move microelectronic workpieces, with the second line being positioned between the first line and the first and second access apertures.

26. (Original) The apparatus at claim 21 wherein the material removal station includes a vessel and a support movably positioned proximate to the vessel and configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and wherein the support is oriented to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

27. (Original) The apparatus of claim 21, further comprising an enclosure having a first surface with a first access aperture and a second surface facing opposite from the first surface and having a second access aperture, the first and second access apertures alone being sized and positioned to allow manual access to the transfer device and all the

processing stations carried by the chassis for loading the microelectronic workpieces and/or servicing an interior region of the enclosure.

28. (Previously Presented) An apparatus for processing microelectronic workpieces, comprising:

a plurality of processing stations, at least one of the processing stations including a thermal processing station having a thermal processing space configured to removably receive the microelectronic workpiece, the thermal processing station further including a heat transfer unit at least proximate to the thermal processing space to elevate a temperature of the microelectronic workpiece;

an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations; and

a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations, the transfer device including a first end effector and a second end effector, each being rotatable relative to the other about a common axis.

29. (Original) The apparatus of claim 28 wherein the thermal processing station includes an annealing station, the annealing station including:

a base;

a support carried by the base and configured to removably contact the microelectronic workpiece;

a lid proximate to the base, at least one of the base and the lid being movable relative to the other between a closed position and an open position, the lid and the base defining the thermal processing space when in the closed position;

a heater positioned between the base and the lid;

a first heat sink positioned proximate to the heater and movable relative to the heater between a first position with the first heat sink in thermal contact with the heater and a second position with the first heat sink spaced apart from the heater; and

a second heat sink positioned proximate to the first heat sink, the second heat sink being in thermal contact with the first heat sink when the first heat sink is in the second position.

30. (Original) The apparatus of claim 28 wherein the thermal processing station includes:

a workpiece support configured to carry the microelectronic workpiece; and

a heat source positioned at least proximate to the workpiece support to transfer heat to the microelectronic workpiece.

31. (Original) The apparatus of claim 28 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line, and wherein the apparatus further comprises an enclosure disposed around at least one of the processing stations, the enclosure having a first access aperture through which the user can manually access all the process stations, the enclosure having a second access aperture accessible to the robot and through which the robot can move microelectronic workpieces, with the second line being positioned between the first line and the first and second access apertures.

32. (Original) The apparatus of claim 28, further comprising an enclosure having a first surface with a first access aperture and a second surface facing opposite from the first surface and having a second access aperture, the first and second access apertures alone being sized and positioned to allow manual access to the transfer device and all the

processing stations for loading the microelectronic workpieces and/or servicing an interior region of the enclosure.

33-56. (Cancelled)

57. (Previously Presented) The apparatus of claim 1, wherein at least one of the processing stations includes an application station configured to apply a material to the microelectronic workpiece.

58. (Previously Presented) The apparatus of claim 1 wherein the transfer device includes a robot having an eccentric projection, and wherein the first and second end effectors are both carried by the eccentric projection and are rotatable relative to the eccentric projection about the common axis.

59. (Previously Presented) The apparatus of claim 1 wherein the transfer device includes a lift positioned to move upwardly and downwardly, and an arm carried by the lift, the arm being rotatable relative to the lift about an axis generally parallel to the common axis, the arm including an eccentric projection, and wherein the first and second end effectors are both carried by the eccentric projection and are rotatable relative to the eccentric projection about the common axis.

60. (Previously Presented) The apparatus of claim 1 wherein the processing stations are carried at a first plane, and wherein the transfer device includes a transfer device support carrying a moveable robot at a second plane below the first plane.

61. (New) An apparatus for processing microelectronic workpieces, comprising:
a plurality of processing stations, an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations, wherein all the processing stations of the apparatus are

manually accessible from a single side of the apparatus for placing wafers at the stations for processing; and

a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations, the transfer device being positioned to release the microelectronic workpieces for processing at the processing stations, the transfer device including a first end effector and a second end effector, each being rotatable relative to the other about a common axis.

62. (New) The apparatus of claim 61 wherein the application station includes a vessel and a support movably positioned proximate to the vessel and configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and wherein the support is oriented to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.